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*Indian Standard*

MECHANICAL AND DIMENSIONAL  
REQUIREMENTS OF AUDIO TAPE CASSETTES  
FOR DOMESTIC USE

*( First Revision )*

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

## MECHANICAL AND DIMENSIONAL REQUIREMENTS OF AUDIO TAPE CASSETTES FOR DOMESTIC USE

( *First Revision* )

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( *Continued on page 2* )

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**IS : 6370 - 1981**

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# ***Indian Standard***

## **MECHANICAL AND DIMENSIONAL REQUIREMENTS OF AUDIO TAPE CASSETTES FOR DOMESTIC USE**

### **( *First Revision* )**

#### **0. FOREWORD**

**0.1** This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 12 January 1981, after the draft finalized by the Recording Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

**0.2** This standard covers the mechanical and dimensional requirements of audio tape cassettes. Information regarding tolerances of form and of position are given in Appendix A.

**0.3** This standard was originally published in 1971. The revision has been undertaken to bring it in line with the latest IEC developments.

**0.4** While preparing this standard, assistance has been derived from IEC Doc: 60A (C.0) 53 'Draft — Proposed amendments to the cassette dimensions of Publication 94A Cassette for commercial tape records and domestic use' issued by the International Electrotechnical Commission.

**0.5** In reporting the result of a test made in accordance with this standard, if the final value observed or calculated is to be rounded off, it shall be done in accordance with IS : 2-1960\*.

#### **1. SCOPE**

**1.1** This standard applies to audio tape cassettes and specifies mechanical and dimensional characteristics necessary to ensure interchangeability of tape cassettes on any tape recorder or player (cassette type).

#### **2. TERMINOLOGY**

**2.1** For the purpose of this standard, the definitions given in IS : 1885 (Part XLVIII/Sec 1)-1978† shall apply.

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\*Rules for rounding off numerical values (*revised*).

†Electrotechnical vocabulary: Part XLVIII Recording, Section 1 Tape recording.

### 3. GENERAL REQUIREMENTS

**3.1** The back edge of the cassette shall be provided with two breakout lugs. When removed, accidental erasing in the recording equipment of the relevant side is prevented.

**3.2** The cassette shall be provided with a pressure pad to hold the tape against the record/replay head.

**3.3** The cassette shall be provided with a screening shield for the record/replay head.

**3.4** The cassette shall be provided with windows to observe the amount of wound and unwound tape.

### 4. TAPE CASSETTE

**4.1** The constructional and dimensional details of tape cassette to permit interchangeability of tape cassettes on any tape recorder or player of different manufacture are specified in Fig. 1 to 11.

### 5. MECHANICAL REQUIREMENTS

**5.1 Capstan Guide Hole** — The maximum diameter of the capstan guide hole shall be as given in Fig. 1.

**5.2 Tape Path and Guidance** — Requirements are shown in Fig. 2, 3 and 9.

**5.3 Tape Guides** — The tape touches the cassette at points on either side of the tape head recesses ( indicated by arrows *U* and *L*, see Fig. 2 and 3 ). Guides are required at these positions. Between the outer guides ( *P* and *S* ) there must be a closed construction so as to prevent dust entering the cassette.

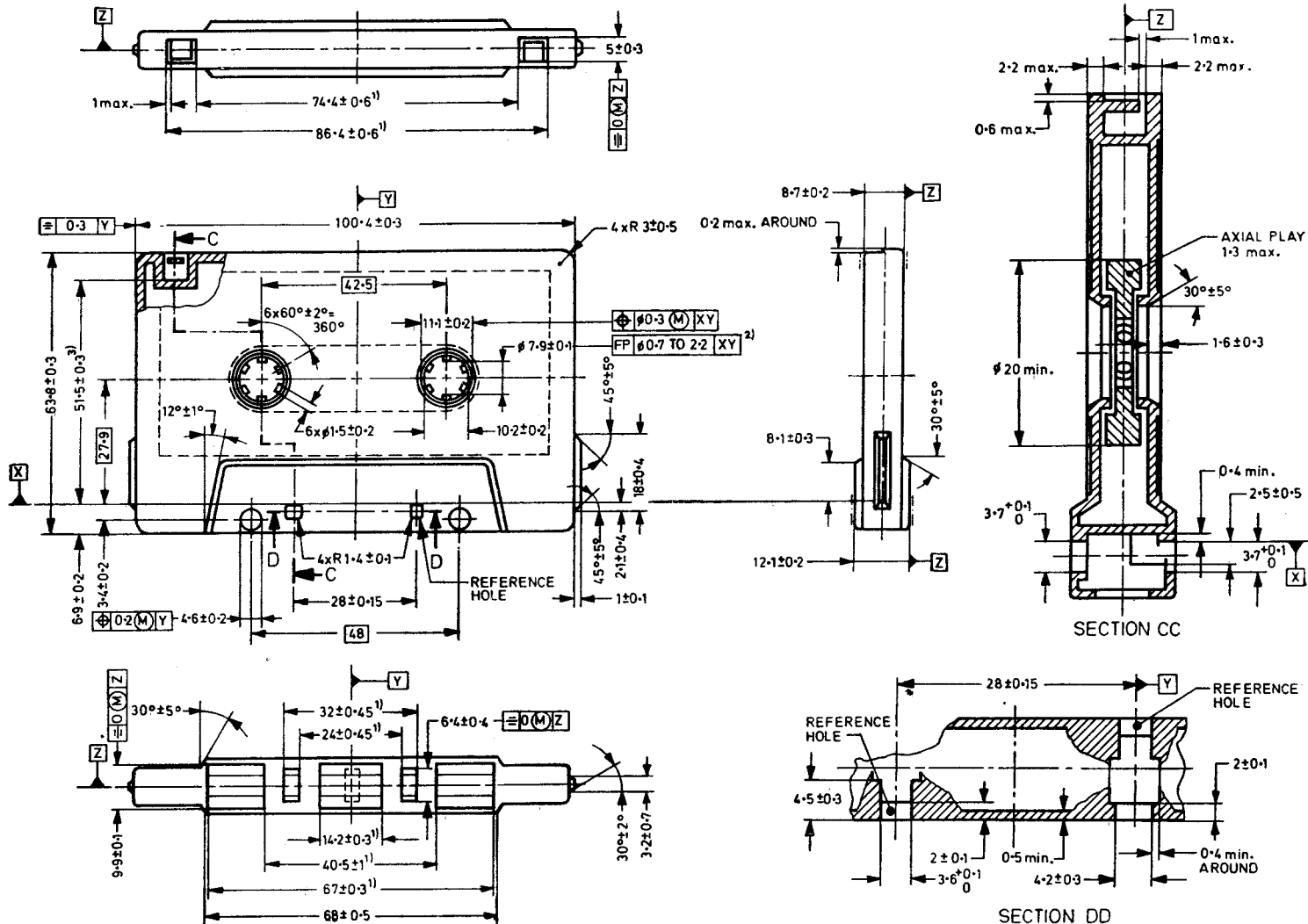
**5.3.1** The guides indicated by the letter *L* shall be perpendicular to the lower support plane. The guides indicated by the letter *U* shall be perpendicular to the upper support plane.




**5.4 Cassette Support Planes** — The cassette shall be supported by the record/playback instrument only on the hatched areas indicated in Fig. 7.

**5.5 Label Area** — The maximum label area shall be in accordance with the dimensions given in Fig. 7. The maximum allowable depression in the thickness of the cassette in the label area is given for each support plane.

**5.6 Window Area** — The maximum window area shall be in accordance with the dimensions given in Fig. 8. The maximum allowable increase in cassette thickness ( required, for example, to accommodate marks indicating amount of wound and unwound tape ) is given for each support plane.

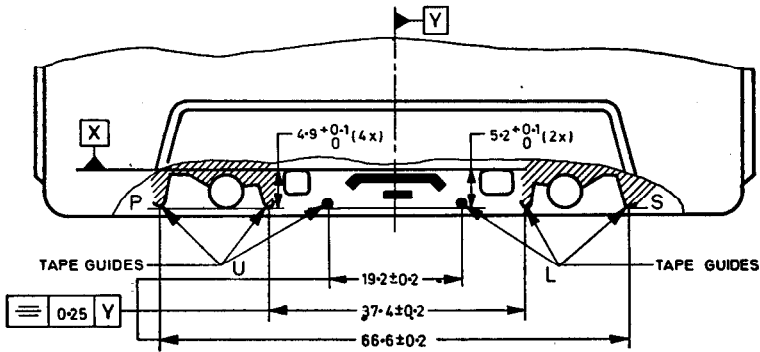




- 1)  The relevant elements are in their maximum material condition symmetrically disposed above the reference line *Z*.
- 2)  Free play of the hub with respect to the rated position of the hub-holes in the assembled cassette.
- 3)  This dimension is for future developments. For the time being a tolerance of  $\pm 0.5$  mm is permitted.

All dimensions in millimetres.  
FIG. 1 CASSETTE DIMENSIONS

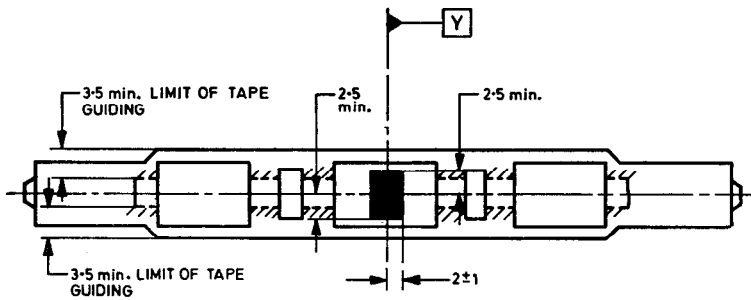
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The radii of the tape guiding surfaces that are in touch with the tape shall be between 0.4 and 1 mm.

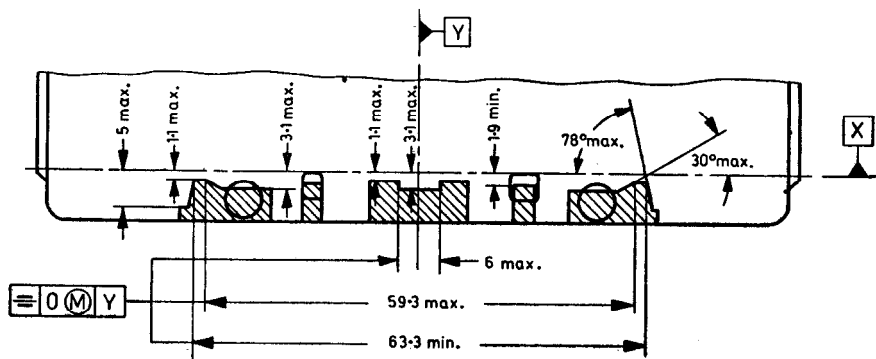
All dimensions in millimetres.

FIG. 2 POSITION OF TAPE GUIDES



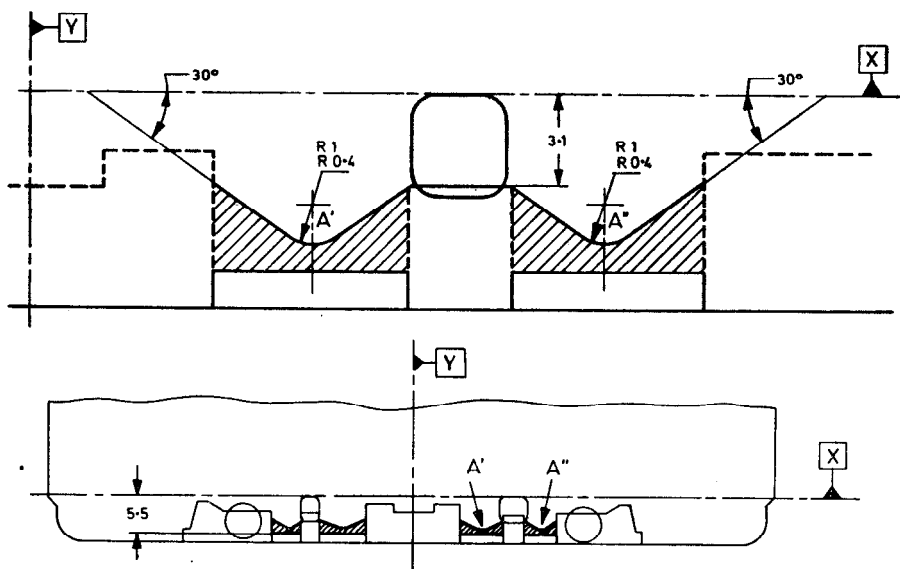
All dimensions in millimetres.

FIG. 3 TAPE PATH



All dimensions in millimetres.

FIG. 4 MINIMUM FREE SPACE BEHIND APERTURES FOR INSERTING ELEMENTS ( EXCLUDING TAPE AND PRESSURE PAD ASSEMBLY )



All dimensions in millimetres.

FIG. 5 AREAS TO BE KEPT FREE FOR TAPE

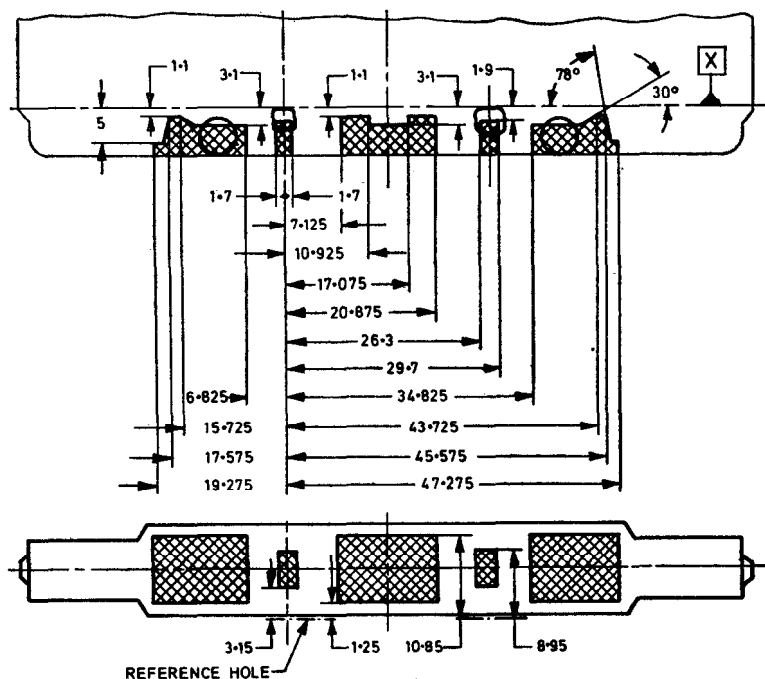
**5.7 Withdrawal Force** — The minimum withdrawal force of the magnetic or leader tape from the hub attachment shall be 10 N.

**5.8 Tensile Strength** — The tape shall be suitable for use with instruments applying a maximum continuous load of 2 N.

**5.9 Friction Torque of the Full Reel** — The maximum friction torque of the full reel in the cassette shall be  $2 \times 10^{-3}$  Nm.

**5.10 Friction Torque of Both Reels** — The maximum friction torque of both reels measured in the cassette itself at the nearly full reel shall be  $2.7 \times 10^{-3}$  Nm.

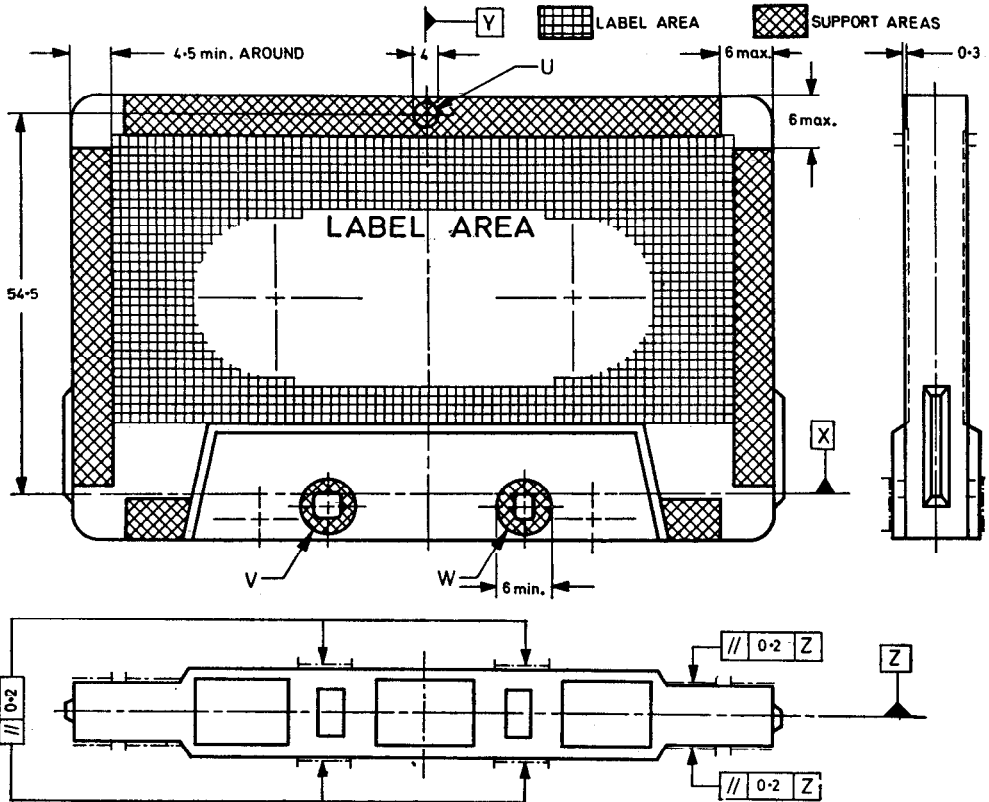
With a holdback torque of  $0.8 \times 10^{-3}$  Nm applied to the nearly empty reel, the required maximum torque to be applied to the nearly full reel shall not exceed  $5.5 \times 10^{-3}$  Nm.



All dimensions in millimetres.

FIG. 6 INTERFACE GAUGE FOR EQUIPMENT MANUFACTURER

**5.11 Pressure Pad** — When the record/playback head is put into the cassette in accordance with the dimensions given in Fig. 9, the pressure of the pad in the magnetic head gap area shall be 0.005-0.015 N/mm<sup>2</sup>.

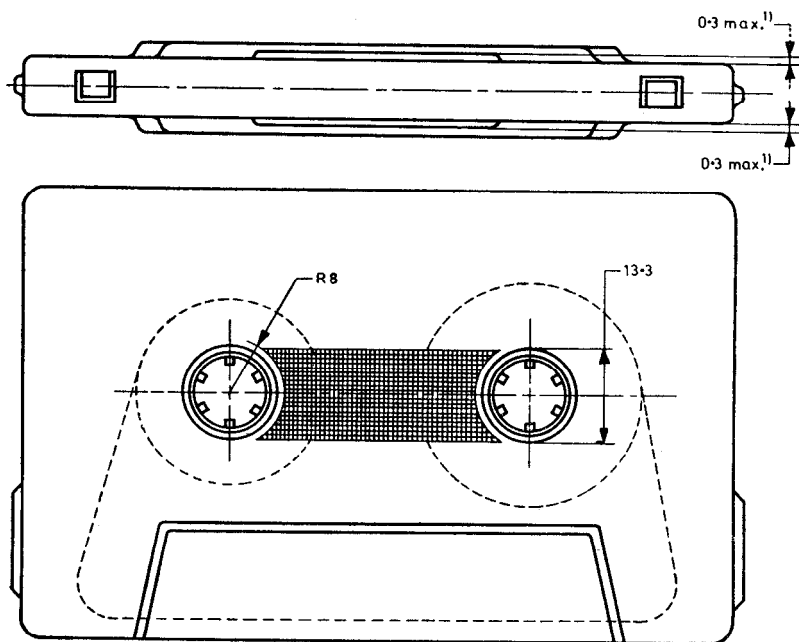


**All dimensions in millimetres.**

FIG. 7 LABEL AND SUPPORT AREAS

**5.12 Relationship Between Parts** — The relationship between the sides of the cassette, the breakout lugs (which when removed prevent accidental erasure of the relevant side) and recorded tracks is given in Fig 10. The dimensions of the lug holes shall be in accordance with Fig 1. However, it is not necessary that the lugs be attached according to the drawing, but only that the space between lug and hole edges shall not exceed 1 mm. The lugs shall be so constructed that they can withstand a force of 3 N applied to point *P* in Fig. 10.

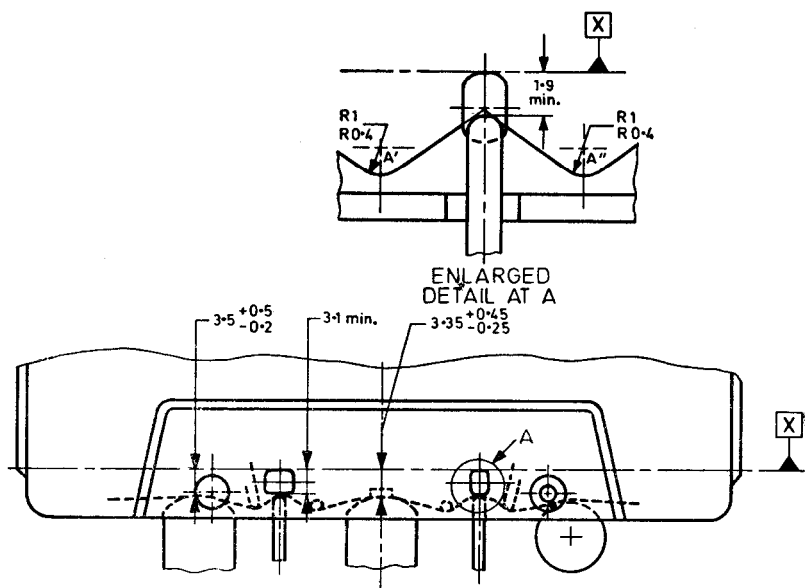
**5.13 Additional Sensing Holes** — If the cassette is to be recorded and/or reproduced with time constants of  $t_1 = 70 \mu\text{s}$  and  $t_2 = 3180 \mu\text{s}$ , it shall be provided with additional sensing holes to set the recording and/or reproducing equipment to this characteristic. The dimensions of these additional holes, which are situated next to the breakout lug are given in Fig. 11.



1) Maximum allowable protrusion in the window area.

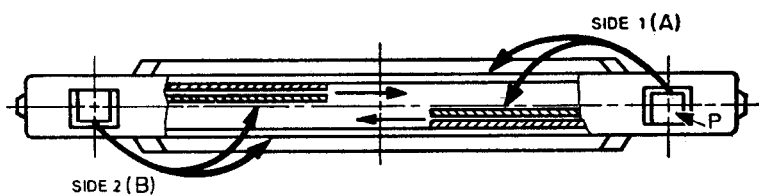
All dimensions in millimetres.

FIG. 8 WINDOW AREA



All dimensions in millimetres.

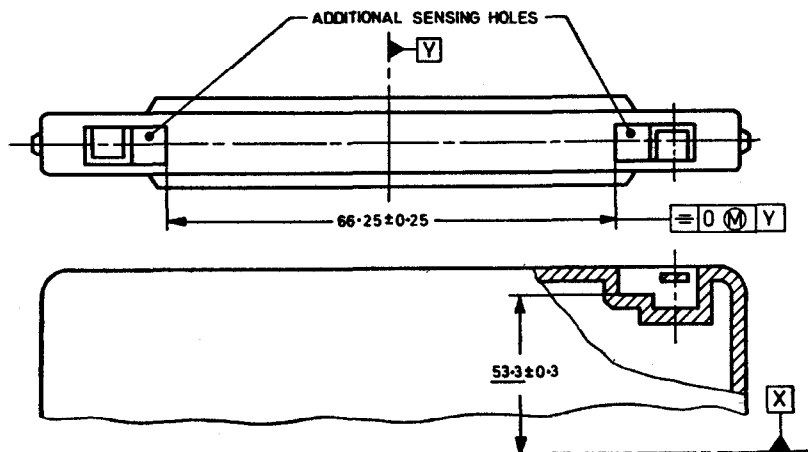
FIG. 9 PRESCRIBED DEPTHS OF INSERTING ELEMENTS



All dimensions in millimetres.

FIG. 10 RELATIONSHIP BETWEEN CASSETTE SIDES, TRACKS AND BREAK-OUT LUGS





All dimensions in millimetres.

FIG. 11 ADDITIONAL SENSING HOLES FOR HIGH RESOLUTION TAPES

## APPENDIX A

( Clause 0.2 )

### TOLERANCES OF FORM AND OF POSITION

#### A-1. GENERAL

**A-1.1** The reason for using the above-mentioned method and especially the maximum material principle, is to give maximum freedom to the manufacturers of both cassette and recorder equipment without endangering the fitness for use.

#### A-2. REFERENCE PLANES

**A-2.1** As the correct functioning depends on the positioning of the cassette in the recorder, the reference planes necessary for the indication of the geometrical tolerances are based on this function.

#### A-3. GEOMETRICAL TOLERANCES

**A-3.1** The geometrical tolerances given for the cassette and where appropriate used in combination with the Maximum Material Condition

(MMC), are indicated in order to guarantee the interface between cassette and recorder while assuring maximum tolerances.

**A-3.2** The maximum material principal is that the difference between the actual size and the minimum size of the hole may be added to the tolerance on the position of that hole.

In other words : the larger the hole the larger the position tolerances can be.

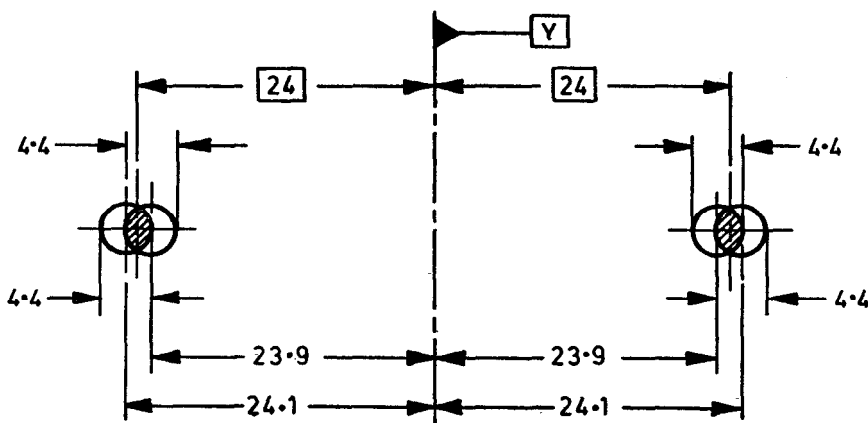
**A-3.3** The dimensioning of the capstan holes in Fig. 1 is to be understood as follows:

The distance between both holes is indicated as 48 . This means that the theoretically exact distance between the centre of a hole and the reference Y is 24.

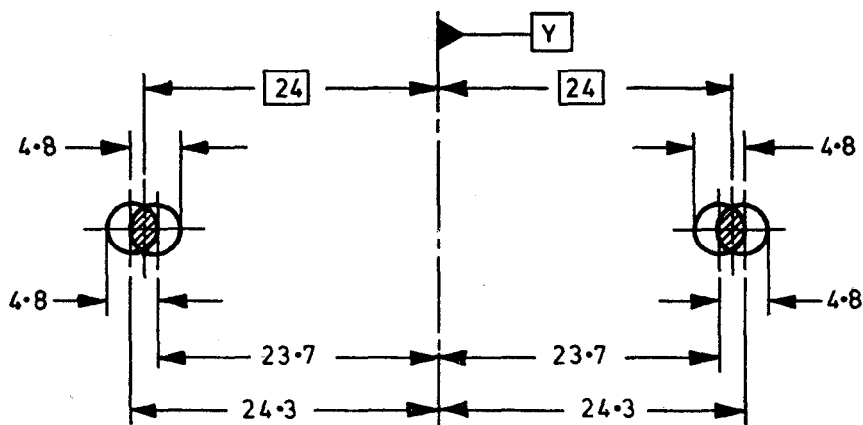
In their Maximum Material Condition, indicated by M , the holes are as small as possible, that is, 4.4.

The indication  $\oplus$  0.2 means that the centre of each hole is to be positioned within a tolerance area of 0.2 thus  $\pm 0.1$ .

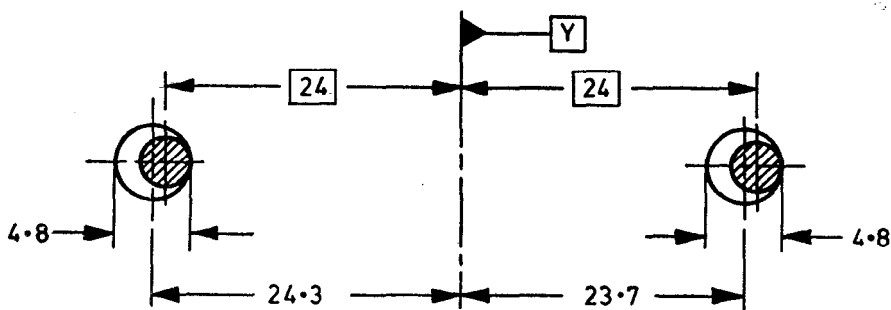
The hatched areas in the following examples represent the free space always available for the capstan, this is always 4.2 mm.



All dimensions in millimetres.  
Extreme position of holes of minimum size (MMC).



All dimensions in millimetres.  
Extreme position of holes of maximum size.















All dimensions in millimetres.  
Extreme asymmetric position of holes of maximum size.

These examples show that the advantage of using a geometrical tolerance in combination with the maximum material principle is that when the hole size is enlarged, the tolerance on that hole position may also be enlarged.

#### A-4. SYMBOLS

The following symbols represent the types of characteristics to be controlled by the tolerance.

CHARACTERISTICS TO BE TOLERANCED		SYMBOLS
FORM OF SINGLE FEATURES	STRAIGHTNESS	—
	FLATNESS	
	CIRCULARITY (ROUNDNESS)	
	CYLINDRICITY	
	PROFILE OF ANY LINE	
	PROFILE OF ANY SURFACE	
ORIENTATION OF RELATED FEATURES	PARALLELISM	
	PERPENDICULARITY (SQUARENESS)	
	ANGULARITY	
POSITION OF RELATED FEATURES	POSITION	
	CONCENTRICITY AND COAXIALITY	
	SYMMETRY	
RUN-OUT		

# INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

## Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

## Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

## Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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